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VdS-Rules for Intruder Alarm Systems

Alarm glasses

Requirements

VdS 2270en : 2002-03 (03)

Contents

1 General

1.1 Scope

These rules contain minimum requirements exclusively for the alarm relevant part of alarm glasses which are used as penetration detectors in intruder alarm systems. These rules do not contain requirements regarding construction and the performance of the glazing. These rules shall be applied in conjunction with the "Rules for intruder alarm systems, general requirements and test methods"; VdS 2227 and the "Rules for intruder alarm systems, protection against environmental influences, requirements and test methods", VdS 2110. The "Rules for alarm systems, software controlled system components, requirements and test methods", VdS 2203, also apply for system components controlled by software.

Alarm glasses typically consist of laminated security glazing with an alarm wire insert or of one-pane security glazing with an alarm loop. An interruption of the implemented wire is leading to an alarm for laminated security glazing. The one-pane security glazing is breaking in small pieces and interrupts the alarm loop when being attacked. For other performances of alarm glasses the monitoring is made e.g. by light within the glazing or by processing of changes of the resistances or the capacity.

Alarm glasses should preferably be used in burglary resistant performances (see listing of VdS approved burglar resistant glazing, VdS 2138 and Rules for physical security devices, burglar resistant glazing, VdS 2163).

The test methods for alarm glasses are described in VdS 2326.

1.2 Validity

These rules are valid from 01. March 2001; they replace the edition VdS 2270 09/92 (02).

Note: This is a translation of the German rules; if there are any discrepancies, the German version shall be binding.

2 Normative references

These rules contain dated and undated references to other publications. The normative references are cited at the appropriate places in the clauses, the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to these rules only when announced by a change of these rules. For undated references the latest edition of the publication referred will be applied.

- **DIN 41 636** Sensitive switches for communication technology
- **DIN 45 631** Procedure for calculating loudness level and loudness
- **DIN EN 60 529** Degrees of protection provided by enclosures (IP-Code) – corresponds with VDE 0470-1
- **DIN EN ISO 6988** Metallic and other non-organic coatings – sulfur dioxide – test with general condensation of moisture

- **DIN IEC 65A/179/CDV : 1995** Functional safety – Safety-relevant systems – Part 1: General requirements
- **EN 61 000-4-2** Electromagnetic compatibility (EMC); Part 4: Testing and measurement techniques; Section 2: Electrostatic discharge immunity test – Basic EMC publication
- **EN 61 000-4-3** Electromagnetic compatibility (EMC); Part 4: Testing and measurement techniques; Section 3: Radiated, radio-frequency, electromagnetic field immunity test
- **EN 61 000-4-4** Electromagnetic compatibility (EMC); Part 4: Testing and measurement techniques; Section 4: Electrical fast transient/burst immunity test
- **EN 61 000-4-5** Electromagnetic compatibility (EMC); Part 4: Testing and measurement techniques; Section 5: Surge immunity test
- **EN 61 000-4-6** Electromagnetic compatibility (EMC); Part 4: Testing and measurement techniques; Section 6: Immunity to conducted disturbances, induced by radio-frequency fields
- **IEC 60 068-2-1** Environmental testing; Part 2: Tests, Test A: Cold
- **IEC 60 068-2-2** Environmental testing; Part 2: Tests, Test B: Dry heat
- **IEC 60 068-2-3** Environmental testing; Part 2: Tests, Test Ca: Damp heat, steady state
- **IEC 60 068-2-6** Environmental testing; Part 2: Tests, Test Fc: Vibration (sinusoidal)
- **IEC 60 068-2-27** Environmental testing; Part 2: Tests, Test Ea: Shock
- **IEC 60 068-2-30** Basic environmental testing procedures; Part 2: Tests; Test Db and guidance: Damp heat, cyclic (12 + 12-hour cycle)
- **IEC 60 068-2-63** Environmental testing, Tests; Test Eg: Impact, spring hammer
- **IEC 60 068-2-75** Environmental testing; Part 2: Tests; Test Eh: Hammer tests
- VdS 2110 Rules for intruder alarm systems, protection against environmental influences, requirements and test methods
- VdS 2163 Rules for physical security devices, burglar resistant glazing
- VdS 2203 Rules for alarm systems, software controlled system components, requirements and test methods
- VdS 2227 Rules for intruder alarm systems, general requirements and test methods
- VdS 2317 Rules for intruder alarm systems, alarm glasses, test methods

3 Terms and definitions

For general terms and definitions refer to the "Rules for intruder alarm systems, general requirements and test methods", VdS 2227.

4 Classification

The **performance criteria** for different classes are defined in the "Rules for intruder alarm systems, general requirements and test methods", VdS 2227.

The **environmental classes** are set in accordance with the "Rules for intruder alarm systems, protection against environmental influences, requirements and test methods", VdS 2110.

5 Protection against environmental influences

5.1 Limits of application

Environmental influences shall not affect the function of alarm glasses. Environmental influences can have various effects on operating characteristics, depending on the nature of the function applied. The manufacturer shall therefore specify the limits of the application (e.g. climate).

5.2 Climates

The function of alarm glasses shall not be adversely affected by the thermic conditions described in table 5.01, appropriate to its environmental class.

Test	Functional test	Endurance test	Degree of severity, abbreviated description of conditions			
			I	II	III	IV
Dry heat (T1) as spec. in IEC 60 068-2-2	x		+40 °C, 16 h	+55 °C, 16 h	+70 °C, 16 h	+70 °C, 16 h [1)]
Dry heat (T2) as spec. in IEC 60 068-2-2		x	No test	No test	No test	+70 °C, 21 d [1)]
Cold (T3) as spec. in IEC 60 068-2-1	x		+5 °C, 16 h	-10 °C, 16 h	-25 °C, 16 h	-25 °C, 16 h
Damp heat, steady (T4) as spec. in IEC 60 068-2-3	x		+40 °C, 4 d 93 % rel. humidity	+40 °C, 4 d 93 % rel. humidity	No test	No test
Damp heat, steady (T5) as spec. in IEC 60 068-2-3		x	+40 °C, 21 d 93 % rel. humidity	+40 °C, 21 d 93 % rel. humidity	+40 °C, 21 d 93 % rel. humidity	+40 °C, 21 d 93 % rel. humidity
Damp heat, cyclic (T6) as spec. in IEC 60 068-2-30	x		No test	+40 °C, 2 cycles	+55 °C, 2 cycles	+55 °C, 2 cycles
Damp heat, cyclic (T7) as spec. in IEC 60 068-2-30		x	No test	No test	+55 °C, 6 cycles	+55 °C, 6 cycles

1) The test at 70 °C shall cover the effect of warming by solar radiation.

Table 5.01: Climates

5.3 Protection against corrosion

Alarm glasses shall have adequate resistance to corrosion as specified in table 5.02.

Test	Functional test	Endurance test	Degree of severity, abbreviated description of conditions			
			I	II	III	IV
SO_2-corrosion (K3) as spec. in DIN EN ISO 6988 (K3)		x	No test	0.2 l SO_2 5 cycles	2 l SO_2 5 cycles	2 l SO_2 20 cycles
Corrosion by window cleaning agent (K4)		x	No test	10 % alcohol, 1 % ammonia, 1 % alkylbenzolsulf., 20 °C, 24 h		

Table 5.02: Protection against corrosion

5.4 Mechanical influences

The function of alarm glasses shall not be adversely affected by mechanical influences as described in table 5.03.

Test	Functional test	Endurance test	Degree of severity, abbreviated description of conditions			
			I	II	III	IV
Shock (M1) as spec. in IEC 60 068-2-27	x		Â(m/s²) = 1000-(200xM) 6 x 3 shocks, duration 6 times 6 ms	Â(m/s²) = 1000-(200xM) 6 x 3 shocks, duration 6 times 6 ms	Â(m/s²) = 1000-(200xM) 6 x 3 shocks, duration 6 times 6 ms	Â(m/s²) = 1000-(200xM) 6 x 3 shocks, duration 6 times 6 ms
Impact (M2) as spec. in IEC 60 068-2-75	x		0.5 J, 3 impacts per point	0.5 J, 3 impacts per point	0.5 J, 3 impacts per point	0.5 J, 3 impacts per point
Vibration sinus (M3) as spec. in IEC 60 068-2-6	x		10-150 Hz, 0.2 g, 1 cycle	10-150 Hz, 0.5 g, 1 cycle	10-150 Hz, 0.5 g, 1 cycle	10-150 Hz, 0.5 g, 1 cycle
Vibration sinus (M4) as spec. in IEC 60 068-2-6		x	10-150 Hz, 0.5 g, 20 cycles	10-150 Hz, 1.0 g, 20 cycles	10-150 Hz, 1.0 g, 20 cycles	10-150 Hz, 1.0 g, 20 cycles

Â = Peak acceleration, M = kg-amount of the mass of the sample

Table 5.03: Mechanical influences

Additionally alarm glasses shall be exposed to a pressure of 3 kN in the area of the terminals to test their stability.

5.5 Electromagnetic compatibility

The function of alarm glasses shall not be adversely affected by electromagnetic influences as specified in table 5.04.

Test	Functional test	Endurance test	Degree of severity, abbreviated description of conditions I	II	III	IV
Electrostatic discharge of low energy (E1b) acc. to EN 61 000-4-2	x		Each 10 times pos. and neg. contact discharge 2, 4 and 6 kV and air discharge 2, 4 and 8 kV	Each 10 times pos. and neg. contact discharge 2, 4 and 6 kV and air discharge 2, 4 and 8 kV	Each 10 times pos. and neg. contact discharge 2, 4 and 6 kV and air discharge 2, 4 and 8 kV	Each 10 times pos. and neg. contact discharge 2, 4 and 6 kV and air discharge 2, 4 and 8 kV
Radiated, radio-frequency, electromagnetic field (E2a) acc. to EN 61 000-4-3	x		80-2000 MHz, 10 V/m as well as 450-466 and 890-960 MHz, 30 V/m modulation: AM 80 % (modulated with sinus) for at least 3 s and in addition 3 times switching on/off of the carrier with 1 Hz and 1 kHz	80-2000 MHz, 10 V/m as well as 450-466 and 890-960 MHz, 30 V/m modulation: AM 80 % (modulated with sinus) for at least 3 s and in addition 3 times switching on/off of the carrier with 1 Hz and 1 kHz	80-2000 MHz, 10 V/m as well as 450-466 and 890-960 MHz, 30 V/m modulation: AM 80 % (modulated with sinus) for at least 3 s and in addition 3 times switching on/off of the carrier with 1 Hz and 1 kHz	80-2000 MHz, 10 V/m as well as 450-466 and 890-960 MHz, 30 V/m modulation: AM 80 % (modulated with sinus) for at least 3 s and in addition 3 times switching on/off of the carrier with 1 Hz and 1 kHz
Conducted radio-frequency (E2b) acc. to EN 61 000-4-6	x		150 kHz-100 MHz, 140 dBµV Modulation: AM 80 % (modulated with 1 kHz sinus) for at least 3 s and in addition 3 times switching on/off of the carrier with 1 Hz and 1 kHz	150 kHz-100 MHz, 140 dBµV Modulation: AM 80 % (modulated with 1 kHz sinus) for at least 3 s and in addition 3 times switching on/off of the carrier with 1 Hz and 1 kHz	150 kHz-100 MHz, 140 dBµV Modulation: AM 80 % (modulated with 1 kHz sinus) for at least 3 s and in addition 3 times switching on/off of the carrier with 1 Hz and 1 kHz	150 kHz-100 MHz, 140 dBµV Modulation: AM 80 % (modulated with 1 kHz sinus) for at least 3 s and in addition 3 times switching on/off of the carrier with 1 Hz and 1 kHz
Conducted electrical fast transient – burst – (E3a) acc. to EN 61 000-4-4	x		Each for a period of 1 min pos. and neg. 0.25, 0.5 and 1 kV	Each for a period of 1 min pos. and neg. 0.25, 0.5 and 1 kV	Each for a period of 1 min pos. and neg. 0.25, 0.5 and 1 kV	Each for a period of 1 min pos. and neg. 0.25, 0.5 and 1 kV
Conducted surge – (E4a) acc. to EN 61 000-4-5	x		5 times pos. and neg. Cl. 3: line – line 0.5, 1 kV and line – ground 0.5, 1, 2 kV	5 times pos. and neg. Cl. 3: line – line 0.5, 1 kV and line – ground 0.5, 1, 2 kV	5 times pos. and neg. Cl. 3: line – line 0.5, 1 kV and line – ground 0.5, 1, 2 kV	5 times pos. and neg. Cl. 3: line – line 0.5, 1 kV and line – ground 0.5, 1, 2 kV
Static magnetic fields (E6)	x		150 mT	150 mT	150 mT	150 mT

Table 5.04: Electromagnetic compatibility

6 Functional reliability

6.1 Provision of functions

6.1.1 Technical data

Technical data describing the alarm glasses shall be provided in the German language. This data shall include all information and parameters necessary for the correct and reliable operation of the alarm glasses.

6.1.2 Installation instructions

Installation instructions written in German language shall be provided for alarm glasses. These instructions shall include a clear illustration of the assembly and installation procedures and information describing the applications for which the alarm glasses are suitable (including an indication of the class according to clause 4 and the indication for which installation sites the alarm glasses are suitable).

6.1.3 Marking

In addition to the rules for intruder alarm systems, general requirements and test methods, VdS 2227, the following requirements are valid:

- marking shall be in such way that it is visible after mounting of the glazing
- the alarm glasses shall be marked such that the mounting position and direction is unambiguously identifiable

6.1.4 Operating voltage behaviour

Nominal voltage, operating voltage range (at least nominal voltage U_N ± 25 %) and maximum permitted ripple of the operating voltage shall be specified by the manufacturer. Alarm glasses shall function correctly within these specified values. Variations in the voltage as specified in table 6.01 shall not adversely affect the function of alarm glasses.

Test	Functional test	Endurance test	Degree of severity, abbreviated description of conditions			
			I	II	III	IV
Operating voltage range system voltage (B1b)	x		U_N ± 25 %	U_N ± 25 %	U_N ± 25 %	U_N ± 25 %
Operating voltage surge system voltage (B2b)	x		10 cycles from U_N +25 % to U_N –25 % and back	10 cycles from U_N +25 % to U_N –25 % and back	10 cycles from U_N +25 % to U_N –25 % and back	10 cycles from U_N +25 % to U_N –25 % and back

Table 6.01: Changes of operating voltage

6.1.5 Ripple of the operating voltage

As a minimum requirement alarm glasses shall function correctly with a voltage ripple of ≤ 1.0 V_{SS} if a nominal voltage of 12 V is specified. For a nominal voltage of 24 V the ripple value is ≤ 2.0 V_{SS}. For other nominal voltages the specifications of the manufacturer shall apply.

6.1.6 Reliability

The selection of components for alarm glasses shall be such that they are suitable for the selected environmental class.

6.1.7 Components

Only components using a technology that has proven to be reliable in various applications, with an unmodified specification over a period of 2 years, may be used. For components of unproven reliability, other means of demonstrating reliability may be considered on an individual basis.

All components shall be operated within the limits specified by the component manufacturer while taking into consideration the effect of ambient temperature (including inherent warming) (see also DIN IEC 65A/179/CDV).

6.1.8 Relays

Relays shall be protected against the effects of dust at least to the degree of protection specified by DIN EN 60 529 (identical with VDE 0470-1) – IP 5x.

Relay contacts shall be designed for at least 10.000 switching cycles at a corresponding connected load.

6.1.9 Switches

Switches shall be fitted with self-cleaning contacts or be enclosed in dust-protected casings complying at least with the degree of protection specified by DIN EN 60 529 (identical with VDE 0470-1) – IP 5x.

6.1.10 Access to assemblies and components

Components of an IAS shall be constructed to ensure easy access to, and replacement of assemblies for the installer. Provisions shall be made to reduce handling errors to a minimum.

6.1.11 Connecting and adjustment elements

Connecting and adjustment elements shall be marked and shall be easily accessible to the installer and maintenance personnel. Connection elements for connection to the IAS shall be designed to ensure reliable operation and protection against corrosion.

For alarm glasses with alarm wire inserts the connection points within the visible area (area connection) shall be arranged diagonally or on the opposite side of the corners.

Adjustments shall be comprehensible (e.g. by the provision of adequate graduation markings).

6.1.12 Operational readiness of the detector after application of the operation voltage

The time between the application of the operation voltage and the reliable operation of the detectors shall be specified by the manufacturer and shall not exceed 120 s.

6.2 Function monitoring

The failure of, or a fault in the central processing units (e.g. microprocessors) shall be signalled.

Security relevant functions (e.g. signal processing and analysis) shall be monitored automatically as far as possible or other means shall be employed to ensure that the failure of any part of the detector will not effect normal operation (e.g. redundant detector). Faults detected by the functional monitoring system shall be signalled.

Note: The design of the interface is described in clause 11.1.2.3.

6.3 Function test

6.3.1 Function test by the installer

It shall be possible for the installer and service personnel to test the function of alarm glasses (except not nondestructive testable functions). The test functions shall allow verification of the actual functions of the detector (e.g. adjust sensibility).

6.3.2 Function test by the operator

No requirements

7 Operational security

7.1 Operation

Actions to be executed by the operator shall be simple. Indicators shall be designed to be clear and easily understood.

7.2 Degree of protection

Alarm glasses shall, if installed, be constructed at least to the degree of protection as specified by DIN EN 60 529 (identical with VDE 0470-1) – IP 67. For system elements which are not installed close to the glazing (e.g. separated processing units) IP3x shall be sufficient.

7.3 Protection against access

Parts affecting the function of alarm glasses as well as connecting elements and adjustment elements shall not be freely accessible; they shall be protected e.g. by covers.

7.4 Sealing capability

External system elements, e.g. processing units of alarm glasses shall be designed to allow the attachment of a seal.

7.5 Error tolerance

Alarm glasses shall be constructed such that they cannot be adversely affected by incorrect operations executed by the operator.

7.6 Setting of parameters

Facilities for the setting of the parameters of alarm glasses shall be designed to allow parameter setting by the installer only with the consent of the user.

8 Tamper

8.1 Tamper protection

Housings of external systems elements, e.g. processing units of alarm glasses shall have adequate mechanical strength. The covers shall be mechanically stable in their fitting.

The indicating and operating elements shall be designed such that they do not weaken the stability of the casing or permit access to the device.

The fastening screws for assemblies shall not be visible externally once the device is properly fitted. It shall only be possible to open these devices using tools. Furthermore, it shall not be possible to see into the devices (except alarm wire inserts and alarm loops).

Significant reduction of the proper function (e.g. because of reproduction of monitoring criteria) shall be prevented; alternatively monitoring in accordance with clause 8.2 shall be provided.

8.2 Tamper detection

Opening of housings of external system elements, e.g. processing units of alarm glasses shall be detected and signalled if, because of it, security relevant functions become accessible. The inside of the system elements and the monitoring of the opening shall be protected against access until the monitoring system has responded.

Only micro-"snap"-switches complying with DIN 46 636 or equivalent parts shall be used for cover contacts. The contact area of the contacts shall be gold-plated or of equivalent finish. Alternatively, reed contacts may be used as long as they cannot be influenced from the outside.

A significant reduction in the proper function of the detectors shall be detected and signalled (see clause 11) if this reduction is not prevented as specified in clause 8.1.

9 Construction

9.1 Stability

Alarm glasses shall be of adequate mechanical strength.

It is advisable to construct alarm glasses burglary resistant (see clause 1.1).

9.2 Stationary installation

Alarm glasses shall be designed that a stationary installation is possible. Further they shall be designed such that a gripping is possible from all sides. Mounting of the glazing shall be in such a way that de-mounting from outside is only possible under difficult conditions (e.g. glass skirting board inside).

9.3 Freedom of potential, isolation resistance

The housing and all parts of the housing of alarm glasses shall be free from electrical potential (with the exception of electrical protective measures). The isolation resistance shall be at least 10 MΩ.

9.4 Shielded cables

Alarm glasses shall be constructed so that the shielded cables can be joined together in a reliable manner.

9.5 Strain relief

Connecting and terminal points of cables and leads shall be relieved of mechanical stress where such stresses can be anticipated.

9.6 Fastening and calibration

Alarm glasses shall be constructed to allow proper installation and calibration. Any special tools required shall be supplied by the manufacturer of the device.

Where the installer is required to calibrate the alarm glasses, the manufacturer shall provide the appropriate calibration devices.

9.7 Setting elements

The manufacturer shall supply the detection characteristics of the alarm glasses at all limiting values of adjustable parameters. The functions and effects of multiple adjustments shall be described if several adjustable features are provided.

Where alarm glasses have only one electrical variable (e.g. range), a setting of "nil" (i.e. no function) shall not be possible. Settings made shall be sufficiently traceable that a maximum deviation of 20 % may occur.

Note: The detector shall meet the requirements for the environmental performance in accordance with clause 5 at all possible settings of adjustable controls; requirements concerning immunity to false alarms shall be met at all settings specified by the manufacturer for the relevant application.

9.8 Indicators

Any existing indicators of the operational status of alarm glasses (e.g. fault condition) shall be unambiguous to the operator of the IAS.

Optical indicators shall be clearly visible to the operator. Audible indicators shall have a minimum volume of 60 dB(A) – measured in accordance with DIN 45 631 – at a distance of 1 m from the signal emitter.

9.9 Installation materials

If special installation material is used for the installation of alarm glasses this material shall be made available by the manufacturer.

10 Function

Alarm glasses shall be designed to provide a high probability of detection and shall signal an intrusion or intrusion attempt as soon as possible.

10.1 Response behaviour

Alarm glasses shall be designed so that a get trough the glass causes a signal. According to the suitable type of the monitoring of alarm glass by the manufacturer the following opening shall lead to a signal.

Monitoring on entry

At entry monitoring an opening or get through of greater 300 mm x 300 mm shall lead to a signal. At visible monitoring (e.g. alarm wire insert) an opening of greater 100 mm x 300 mm shall lead to a signal.

Monitoring on reach-in

An opening or get trough of greater 40 mm x 40 mm shall lead to a signal.

Monitoring on reach-in with auxiliary tools

An opening or get trough of greater 15 mm x 15 mm shall lead to a signal.

10.2 Response probability

The probability the get trough of alarm glasses causes a signal according to clause 10.1 shall amount at visible monitoring measures minimum 95 % and at non visible measures minimum 90 %.

10.3 Indifference towards undesired triggering

Alarm glasses shall be designed such that it shall trigger with great probability not by other effects than by these specified as triggering criterion.

An alarm shall be generated only in case of a remaining mechanical change of the glazing (e.g. crack).

10.4 Defeating the detector by bypassing the monitoring area

Alarm glasses shall be designed such that they cannot be defeated by taking measures against undesired triggering.

10.5 Interference suppression

Interference suppression shall be implemented such that the response characteristic of the detector is not significantly affected as the interference suppression responds.

10.6 Triggering indication

Alarm glasses containing electronic components shall permit connection to the IAS in such a way that the operator is able to determine which detectors have triggered. Once these detectors have triggered, it shall be ensured that the information concerning the triggering of the detectors is not modified in the unset state of the IAS.

Note: See clause 9.8 for the indicator design.

It shall be possible for the operator to delete this information. Undeleted information concerning detector triggering shall block a set procedure; alternatively, this information shall be deleted automatically during setting of the IAS.

10.7 State of the device beyond the limits of the operating voltage

If the detector is outside the operating voltage range (loss of voltage) and if the specified performance is no longer fully available, an intrusion signal shall be issued. In addition a fault signal may be issued.

10.8 Renewed readiness of the system

A detector shall be ready to signal again within 10 s of a signal being issued by the detector or the end of the criterion triggering this signal. Except for detectors which are destroyed by response.

10.9 Operating statuses

If the function of the detector is wholly or partially switched off (e.g. detector switched off, or alarm relay switched off) in certain states of the IAS (e.g. in the unset state of the IAS), the control lines for such switching actions shall be monitored for interruption, or a "secure" (fail-safe) condition (e.g. function in accordance with the designated function) shall be adopted in the event of an interruption. In the case of a dynamic control system, a signal indicating the operating status of the detector shall be issued or the switched-off condition shall be reversed automatically each time the IAS is set.

11 Interface to IAS/Hold-Up Alarm Systems

Interfaces to other parts of the system, e.g. to the intruder alarm control and indicating equipment, shall be designed to ensure proper functioning. A combined test may be necessary depending on the design of the detector and the other parts.

All interfaces shall be specified in detail by the manufacturer. Alternatively, the interfaces described in clause 11.1 can be used.

Note: A detailed specification of the interfaces may only be omitted if all requirements of clause 11.1 are fulfilled.

11.1 Interface for conventional line technologies

The following requirements shall apply to the inputs and outputs of alarm glasses with an external power supply in accordance with clause 6.1.4 and a "conventional" line termination technology (end-of-line resistor).

11.1.1 Inputs

11.1.1.1 Operating voltage

Alarm glasses shall be provided with supply voltage terminals.

11.1.1.2 Additional inputs

The relevant values shall be declared by the manufacturer.

11.1.2 Outputs

11.1.2.1 Interface for intrusion alarms

For alarm glasses with separate processing the interface shall meet the following requirements:

- potential-free output, load capability of at least 50 mA at 30 V DC, series resistance ≤ 47 Ω
- closed in the non alarm state (low resistance), opening in the event of a signal (high resistance)
- response time ≥ 1 s to ≤ 10 s, the contact shall close/the output shall become low resistance no later than 10 s after the end of the criterion triggering the alarm
- facility for connecting a monitoring element (e.g. end-of-line resistor)

For alarm glasses without processing (e.g. alarm glasses with alarm wire insert) these shall be supplied with a solid four-veined supply wire of the same colour. The length of the supply wire shall at least amount 1.50 m or be provided with a suitable, corrosion protected plug-compound.

11.1.2.2 Interface for tamper alarms according clause 8.2

The interface shall meet the following requirements:

- potential-free output, loading capability of at least 50 mA at 30 V DC, series resistance ≤ 47 Ω
- closed in the non-alarm condition (low resistance), opening in the event of a signal (high resistance)
- response time corresponding with the duration of the tamper detector response

11.1.2.3 Interface for fault signals (if available)

The interface shall meet the following requirements:

- execution in accordance with manufacturer data
- response duration at least 1 s, max. according to the duration of the fault

11.1.2.4 Additional outputs

The relevant values shall be given by the manufacturer.

11.2 Interfaces for other techniques

The performance shall be specified by the manufacturer.

12 Options

Options shall have no adverse effect on the functions required for alarm glasses. The performances of the options shall be specified by the manufacturer.

Changes

Compared with edition VdS 2270 11/95 (02) the following changes have been made:

- Addition of clause 2 (new) "Normative references"
- Complete revision of clause 5 "Protection against Environmental Influences" in addition of the environmental tests T2 in clause 5.2
- Addition of clause 5.4 "Mechanical influences" in addition of additional requirements for connection points
- Addition of clause 6.1.2 "Installation instructions" in addition of the requirements to the description of suitable installation areas
- Revision of clause 6.1.6 "Reliability"
- Addition of clause 6.1.11 "Connecting and adjustment elements" in addition of the requirements to adjustable adjustments
- Deletion of the requirements of clause 6.3.2 "Functional test by the user"
- Addition of clause 7.2 "Degree of protection" for the value IP 67 for the actual alarm glass
- Addition of clause 7.6 "Setting of parameters"
- Deletion of the requirement for the holding time in clause 8.2 "Tamper Detection"
- Change of the requirements to the necessary signals in clause 10.7 "State of the device beyond the limits of the operating voltage"
- Change of the requirements to the monitoring of the control lines in clause 10.9 "Operating statuses"
- Editorial changes